SOUTHEAST ASIAN REGIONAL TRANSPORT SURVEY

62

INCEPTION REPORT

REPORT TO THE ASIAN DEVELOPMENT BANK

Arthur D. Little, Inc.

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December 16, 1969

Asian Development Bank
Metropolitan Bank Building
Ayala Avenue
Makati, Rizal

Gentlemen:

We are pleased to submit our Inception Report on the Regional Transport Survey.

We deeply appreciate the contribution which the Bank and the participating governments have given us in facilitating our work, arranging interviews, and providing valuable insights.

We realize that, at this stage, we still have much to learn. However, it is the unanimous feeling of the professional staff involved in the project that we have an understanding of the problems, plans, and agency structures within the various countries. Some of our plans for future work will undoubtedly change as we test our hypotheses.

We believe that we have a firm basis for recommending to you our future courses of action.

Very truly yours,

Richard J. Coveney

RICHARD J. COVENEY
Project Director

INCEPTION REPORT

Southeast Asian
Regional Transport Survey

A REPORT TO

THE ASIAN DEVELOPMENT BANK

December, 1969

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TABLE OF CONTENTS

	Page
List of Figures	iv
SUMMARY	1
I. INTRODUCTION	4
A. PURPOSE OF THE INCEPTION REPORT	5
B. OBJECTIVES OF THE REGIONAL TRANSPORT SURVEY	5
C. ACTIVITIES DURING THE INCEPTION PERIOD	7
II. AIMS AND TASKS OF THE SURVEY	10
A. INTRODUCTION	10
B. THE RATIONALE	10
C. THE ROLE OF ECONOMICS IN THE RTS	10
D. TASKS OF THE RTS	11
E. SCOPE OF THE SURVEY	15
F. RANGE OF INVESTIGATION	16
III. THE STARTING POSITION	22
A. THE DATA BASE	22
B. TRANSPORT CHARACTERISTICS OF THE REGION	28
C. ECONOMIC CHARACTERISTICS OF THE REGION	35

	Page
IV. METHODOLOGY	38
A. BASIC FRAMEWORK FOR THE SURVEY	38
B. CYCLICAL NATURE OF THE SURVEY	40
C. DETAILED METHODOLOGY	42
D. SUMMARY OF APPROACH AND METHODOLOGY	51
V. PROGRAM FOR THE REGIONAL TRANSPORT SURVEY	52
VI. ORGANIZATION	70

LIST OF FIGURES

Figure No.		Page
1	Functional Flow Chart	69
2	Regional Transport Survey Organization Chart	72

SUMMARY

During the Inception Period, the ADL Team, together with its subcontractors and consultants, has established an office in Manila, and assembled and reviewed a substantial amount of data pertaining to the economic and transport structure of Southeast Asia.

We have visited each of the countries participating in the RTS and have benefited from numerous interviews with Government officials involved in national planning as well as the individual transport and economic sectors. We have also conducted interviews within the private sectors and within international agencies which are involved in the Region.

The Team has held daily cross-disciplinary meetings to review findings and arrive at the plan of action for Stage II of the RTS. It is in the nature of such a study as this that changes will occur in this plan in response to further research. We nevertheless believe that this plan is not only sound but can be carried out within the period of the RTS. Our conclusions and specific plans are detailed in Chapters I - VI of this report and are summarized below.

A. AIMS AND TASKS OF THE SURVEY

Through its Charter, the Asian Development Bank was commissioned to foster economic growth and cooperation among the nations of Asia. The basic aim of the Regional Transport Survey is to help translate the ADB's objective into broad strategies through which transport can combine with other economic factors to further development on a regional scale.

Our primary efforts will be devoted to the development of a framework for assessing possible transport investments and the development of proposals for action programs.

There are five specific tasks which we will perform:

1 The preparation of a status report during the Interim Period which will describe the present economic and transport systems in the Region;

2. The preparation of forecasts to 1990 of the Region's economic and transport structure;

3. The development of a framework for assessing and coordinating transport investment programs;

4. The development of action programs;

5. The dissemination of methods and approaches developed in the course of the Survey.

B. ASSESSMENT OF DATA BASE

Although the existing data base exhibits some gaps, we have concluded that it is solid enough to provide a satisfactory foundation for the Survey. We look forward to working together with the counterpart teams in seeing how important deficiencies can best be filled.

C. METHODOLOGY

The methodological approach we have developed will enable transport and economic factors to be interrelated logically and continuously so that a balance between economic needs and transport development can be maintained.

The approach we have planned is of a cyclical nature, each cycle to consist of four steps:

First, to assess the status and the scope for development of the economies and the transport systems in the region;

Second, to determine the most suitable transport systems for these activities;

Third, to schedule the resources needed to meet the economic and transport requirements identified during the first and second steps;

Fourth, to compare these resource requirements with those which the first step suggested would be available.

We propose to repeat this cycle a minimum of three times. During the first cycle, we will use the information we have already acquired.

The relation between the first cycle and the interim work specified in our current contract should be carefully noted. Our interim work will result in a Status Report consisting of a description of the present transport and economic systems in the Region. This report will be produced during the first half of the first cycle, and be submitted according to the contract schedule. The results of the first cycle together with more detailed investigations of the transport and economic systems in the Region will form the base for the second cycle. This will be completed at the end of October 1970.

The third cycle work will consist of adjusting and refining the major conclusions reached during the second cycle. It will be completed at the end of January 1971 and will lead to the draft of our final report which will be submitted the end of March of 1971.

D. PROGRAM

A concrete program, comprising thirty-three interlocking steps has been developed to carry out the methodological concepts. It makes use of known economic and systems-analytic techniques, adapted for the present purposes, and it keeps the use of computers to a minimum. The results of each calculation will be subjected to inspection and judgment by experienced economists and transport experts during each cycle before being used in further calculations.

I. INTRODUCTION

For some time, the governments of the Philippines, Thailand, Singapore, Indonesia, Malaysia, Laos, the Republic of Vietnam and Brunei have discussed with the Asian Development Bank a comprehensive transport study which could be helpful to the development of the Region.

The governments above except for Brunei, have signed a participation agreement with ADB calling for a study of transport, designed to improving the economy of the Region.

The ADB in turn entered into a contract with Arthur D. Little, Inc. to carry out the Survey. We assembled a permanent team of ADL transport specialists and economists. ADL also engaged a multinational group of subcontractors to help in carrying out the work. These subcontractors include KAMPSAX of Copenhagen, W. D. Scott and Co. of Sydney, Adrian Wilson Associates of Los Angeles, Pacific Consultants, K. K. of Tokyo, SyCip, Gorres, Velayo & Co. of Manila and a group on leave from Saguenay Research of Montreal.

During the Inception Period, representatives from these companies have been present to assist us in formulating a final plan for the Interim Period and for Stage II.

The Inception Report is the product of the entire Team.

A. PURPOSE OF THE INCEPTION REPORT

The purpose of this report is to lay out the work we propose for Stage II of the Regional Transport Survey, in the light of what we have learned during Stage I. The required content of the report is specified in Section 2.03 (a) of our contract, and reflects the intent of our proposal dated February 14, 1969.

Stage I of our contract was devoted to examination of the data base and to a preliminary planning effort.

The work was to result in:

1. The assignment of areas of investigation in accordance with the Terms of Reference;

2. The specification of a feasible set of tasks that would accomplish the aims of the Survey; and

3. The development of a program of action that would carry out these tasks.

This report contains the essential results of our inception studies.

B. OBJECTIVES OF THE REGIONAL TRANSPORT SURVEY

The Terms of Reference (TR) lay down the objectives of the survey as follows:

1. To study the existing transportation network in the region... and to examine the limitations and inadequacies...that stand in the way of meeting the transport requirements of the region...

2. To recommend measures for development of regional transportation networks...including recommendations on investment programmes based on an economic evaluation of projects;

3. To recommend measures for greater inter-country cooperation in regional transport in terms of provision, use, and management of transportation facilities;

4. To enquire how transport, along with other inputs, can help to develop the region's resources, to modernize agriculture, to

develop industries, and thereby raise living standards generally throughout the region. The survey should identify selected economic activities which could be promoted by development of transportation;

5. To recommend arrangements for collecting and maintaining basic data in the field of transportation and for planning of transport development on a sound basis; and

6. To recommend creation of organizations suitable for maintaining continuity in the common consideration of transport development in the region, including research, training and pooling of experience and knowledge among the countries of the region.

It is later said (TR, paragraph 19) that --

> "An important purpose to be served by the Survey should be to develop a set of criteria on the basis of which investment programs proposed can be assigned priorities and coordinated into a balanced action program."

It is also said (TR, paragraph 20) that --

> "In each field the consultants will recommend appropriate investment programs based on identification of projects for improvement and extension of existing facilities and creation of new facilities, having regard to the programs recommended for the other fields."

We conclude from our interviews with officers of the Bank, and our own appraisal of the environment of the Survey, that these latter two objectives should have first priority. The development of criteria is not explicitly listed in paragraph 5 of the TR (specific objectives of the survey), but we believe that it should be adopted as a major goal of the Survey if our work is to have lasting value. The recommendation of investment programs should be a logical result of the application of the criteria to the findings and projections developed in the course of the work program specified in the latter sections of the TR. Since the investment program is an explicit major goal, the need for underlying criteria implies that the development of these criteria should also be taken as a major goal. This is our first fundamental assumption.

Our second fundamental assumption concerns our report on the current status of transport. The first objective listed in paragraph 5 calls for a study of the existing network and existing bottlenecks. We regard such work as a necessary support for the main objectives, but we do not adopt it as the force governing the thrust of the study. There are two reasons for this: First, the transport systems of the several countries are being studied intensively (or have been recently) by strong teams of experts funded by international agencies, and the findings of these teams are available to the governments of the countries concerned and, in most cases, to the Bank and to us; second, we do not have the necessary sanctions to carry out a probing research into the operations of the individual transport activities of the participating countries. We expect to make use of all the available studies and will relate their findings to the regional transport net. We will also record and collate the observations made by our team in the course of their contacts with the individual transport systems of the countries, but we do not intend to support our findings and comments with the weight of research that would be needed for a definitive study.

We expect to attain the third and fourth objectives as a by-product of the work governed by the first two.

The fifth and sixth of the listed objectives deal with data collection, planning, and research. We regard these as important objectives and, at an early stage of our work, we will make functional and organizational recommendations concerning these and will work with our counterpart forces.

The Terms of Reference go on to list a number of detailed work packages. We accept these, and in Chapter V of this report, we outline a program in which they are incorporated.

C. ACTIVITIES DURING THE INCEPTION REPORT PERIOD

In the last two months, the permanent team has been assembled in Manila. It has:

1. collected and examined a library of reports, maps, and tables;
2. sent delegations to visit each of the participating countries;
3. formed itself into a cooperative and highly interactive working group;

4. carefully re-examined the Terms of Reference of the RTS; and

5. formulated and agreed on a methodology and program of work for attaining the goals and accomplishing the tasks stated in the TR.

Key members of the staffs of our subcontractors have taken part in this activity. The team has also been assisted by consultants who have experience as high executives in the fields of air and sea transport. These consultants, who will also assist in the implementation phase (Stage II) of the program, provide us with sound judgment in the broad aspects of their fields, and have contributed to the detailed work program.

Our staff of transport experts have familiarized themselves with the current state of the transport systems of the several countries in the region, briefly reviewed the individual development plans, and assessed the reports of transport study groups as they have been made available to us. In some cases, the reports have not yet been reviewed by their sponsors and so were not released to us; in these instances we discussed, with the authors, the frame of reference, so that we know what material will be available when the reports are released. By means of continuous discussions among the team members who are representatives of the individual modes of transport, we have begun to develop concepts of inter-modal competition and complementarity, and to appreciate the importance of ports, terminals, and junctions as storage and transfer activities linking one mode to another.

In addition to collecting and assessing basic economic data for the Survey, our staff of economists have reviewed existing economic reports and studies dealing with Southeast Asia, including the countries' national economic development plans, surveys by the ADB and other international financial institutions and a broad range of studies conducted by ECAFE. We have been assisted greatly during this early stage of work by the background work done by ADB, and particularly by their very detailed and comprehensive compilation of recent RTS trade statistics. We have also been greatly assisted by the Japan Economic Research Center (JERC) through its preparatory study for the RTS. Both of these efforts will prove useful throughout our study, in that they address themselves to more than merely collecting background information - they also provide principles and methods which are highly relevant to our further work. The JERC's Review of Trends and Projections

(Volume I) provides a most useful critique of existing research in forecasting economic growth in Southeast Asia. The JERC models developed in that study will yield useful inputs for our analysis.

We have learned of a number of economic surveys and studies that will be conducted during the period of the RTS, by ADB, ASEAN, ECAFE, and others. We have taken these studies into account in making up our work program. We have also made contact with a wide range of organizations (both public and private, national and international) as well as with individuals who are well informed about the economic development of the region and have expressed willingness to assist us.

Finally, the economic and transport staffs have held many joint meetings, first to acquaint each other with the basic nature of their respective fields, and afterward to examine jointly the conceptual and practical problems involved in a study of regional transport/regional economics. They have developed the foundation for a mutually acceptable framework of analysis, and are reaching a common vocabulary.

We have found that the statistical data base, the reports of operations of transport systems, and the body of studies published or to be published (taken together), provide an adequate foundation for the Survey. Much work, however, will have to be done to organize this material on a regional basis.

The remainder of the Inception Report is divided into five chapters. Chapter II discusses our interpretation of the aims and tasks of the Survey, and elaborates on the areas of investigation to be studied. Chapter III is a statement of the essential elements of the RTS's starting position with respect to transport, economics, and the relevant data base in Southeast Asia. Chapter IV explains the conceptual approach and methodology of the Survey, and Chapter V explains and describes our proposed work program. Chapter VI outlines the organization and assignment of responsibilities for the execution of the work program.

II. AIMS AND TASKS OF THE SURVEY

A. INTRODUCTION

This chapter presents our understanding of the rationale underlying the RTS and of the fundamental objectives it is to aim at. Given these objectives, we then outline specific areas of investigation that we believe deserve emphasis in the study, in the light of our preliminary evaluation of the economic and transportation needs of the region and the existing data base.

B. THE RATIONALE

In its charter, the ADB was commissioned to foster economic growth and cooperation between Asian countries. In the context of this commission, the Bank now seeks to explore the extent to which transportation investments can encourage regional economic development and cooperation. Transportation has been chosen because of the important role it has played in the history of economic development. In the perspective of economic growth, transportation investments can directly stimulate growth in employment and incomes through the construction effort involved, release economic potential, and stimulate related investments.

The Regional Transport Survey seeks to translate the ADB's objective into working knowledge of how transport and other economic factors should be combined to achieve that progressive economic development on a regional scale which will yield in Southeast Asia a better future for all. Specifically, the Regional Transport Survey seeks to assist the ADB in its loan and technical assistance activities in the field of transportation.

C. THE ROLE OF ECONOMICS IN THE RTS

To assist the ADB in its undertaking, the RTS will examine existing and proposed transport facilities in the light of its assessment of the future economic aspects of the countries of SEA. An examination will also be undertaken to delineate additional transport projects that will be needed to facilitate and stimulate economic growth.

The economic development studies will expose opportunities for promotion and acceleration of economic development on both a national and regional scale. Opportunities for increased mutual trade may be uncovered through the probable expansion of the component economies of the RTS region, and through the activation of the potential for harmonization of national strategies aimed at enlarging each country's industrial base.

In assessing the future performance of the economies of the SEA countries, the RTS will pay special attention to resource development and other forms of economic activity which will facilitate the mutual exchange, through transport investments, of products and factors of production. In contributing to the financing of cooperative transportation projects, the ADB can, by the planned use of technical assistance and loan agreements, contribute to the removal of deficiencies in other fields, and it will be one of the tasks of the RTS to develop recommendations to this end.

D. TASKS OF THE RTS

The main tasks which will be carried out during the Survey are as follows:

1. The preparation of a status report during the Interim Period describing the present economic and transport systems in the Region.

2. The preparation of forecasts to 1990 of the Region's economic and transport structure.

3. The development of a framework for assessing and coordinating transport investment programs.

4. The development of action programs.

5. The dissemination of methods and approaches developed in the course of the Survey.

1. The First Task: Status Report Describing the Present Economy and Transportation System in the Region

A comprehensive picture of the Region's economy and transport system has not been drawn, and the Regional Transport Survey will fill

that gap with a status report which will be submitted at the end of the Interim Period. This Report will describe the Region, its economy and its transportation system as they existed at the time of observation. As will be noted in Chapter III, economic and transport data have been extensively developed for individual countries and for larger groups of countries such as the ECAFE region. Building block information exists for preparing a description of the current status of the RTS region, but no status reporting for this Region as a whole has been attempted.

Thus, it is an important task of the RTS to collate and present comprehensive information on the state of the regional economy and on the individual RTS countries which form its parts, and on the region's transport system in terms of its plant, its geographical extent, and its present and potential performance.

2. The Second Task: Forecast of the Economic and Transport Development in the Region

The second major task of the Regional Transport Survey is to forecast the Region's economic and transport development for the period to 1990. (The Terms of Reference set the horizing at 1980, but for reasons stated in Section E of this chapter, we propose its extensions to 1990.)

The projection techniques employed will be designed to indicate the nature, extent, and location of the future needs for transport services. The pattern of future transport needs that will be projected will itself suggest certain transport investments that must be made to permit the projections to be fulfilled; it will also provide hypothesized future regional and national economies against which both the potential transport investments revealed by the modal transport surveys and the sector economic studies may be evaluated in financial and economic terms.

As the forecasting studies proceed, information will be developed on such questions as:

- major bottlenecks of regional significance in the system;
- urgent needs for action to reduce cost, enlarge capacity, and improve reliability;
- potential economic and/or industrial development projects.

3. The Third Task: Framework for Transportation Development

Many transportation studies and development plans have already been made in most of the participating countries. These studies and plans treat specific transportation problems in the individual countries in a depth and detail that will not be possible in the present survey. Since the Survey is regional, intermodal, and economic-growth oriented, its prime concern will be the development of an overall framework for the evaluation of transport capabilities and for assessment of the relative priorities of programs and projects for the expansion of these.

An essential step in this approach is a cost-and-service oriented analysis of all modes of transport in the Region. This analysis is expected to lead to a quantification of the economic loss caused by major known inadequacies in the system and probably, to the identification of important constraints not yet fully recognized and of potential demands for transport not met by the system.

An equally important step is an assessment of the capability of the transportation system to expand to meet the needs of economic growth and to induce a new economic development in areas and fields where lack of transportation is a constraint.

Expansion of transport capabilities can promote and accelerate economic growth in four distinct ways:

a. By expanding the system to reach areas and people that today are not served by modern transport. The modes involved are road, rail, air and, possibly in a few cases, shipping.

b. By establishing links between systems that are not linked today. The modes involved are road, rail, ferries, and possibly an occasional port or navigation channel.

c. By improving the existing system in order to reduce transportation cost and time and/or to offer a safer and more reliable service.

d. By increasing the capacity of the existing system to meet increases in transport demand.

For all four types of transport development, particular attention should be paid to the technological innovations that are rapidly changing the structure of transportation elsewhere in the world. Unless the Region in time adapts its transportation system to such changes it may, 10 to 20 years from now, find itself at a serious disadvantage in the global environment.

The introduction of new techniques requires years of planning and many more years of implementation. Thus, it may be advisable to initiate such innovations, at least on a pilot scheme basis, long before they appear commercially feasible.

4. The Fourth Task: Action Programs

The cyclic process proposed in Chapter IV and elaborated in Chapter V will result in recommendations for an investment program and for the creation of new transport-related institutions or restructuring of existing institutions. Since many relevant studies have already been made in the interests of transport development for the several countries, and a number of concrete improvement and expansion programs are already being implemented, our recommendations will take account of them.

5. The Fifth Task: Dissemination of Information

The success of many of the survey's activities will, to a large extent, benefit from the cooperation of the various national transport and planning agencies. This cooperation is taken to mean that existing transport and planning agencies, will by the terms of the Participation Agreement, place all available data required at the disposal of the Team and collaborate with the survey by assigning counterpart staffs.

We believe that the end of the survey is only the beginning of a period of greater activity in the field of regional transport coordination. We therefore plan during the RTS to consider the feasibility of a permanent regional organization which would further refine, coordinate and assist in the implementation of regional transport projects. To this end, we hope to collaborate with regional and international

organizations already active in the fields covered in the survey as a great many of the questions to be answered have already been studied or considered by them. We hope that the interaction with these agencies or organizations will result in concepts useful for regional transport coordination.

To encourage cooperative planning within the Region itself, any technique, presentation format or concept of interest to national planning agencies that may emerge from our studies will be made available to the liaison officers of the Coordinating Committee.

E. SCOPE OF THE SURVEY

The scope of the Regional Transport Survey is defined in further detail by the following:

1. We understand the RTS Region to cover the nations of Laos, Thailand, Malaysia, Singapore, Indonesia, the Philippines, and the Republic of Vietnam. Where it is necessary, data will be collected and analyses carried out regarding Brunei, Burma and Cambodia. Consideration will also be given to other areas in the world whose present or future actions will affect the economies of the RTS Region.

2. All modes of transport will be covered in the survey.

3. The forecasting studies will cover the period 1970-1980 in some detail and 1981-1990 more broadly. We believe that the forecasting horizon of 1980 suggested in the ADB's Terms of Reference should be extended to 1990 for the following reasons:

   - The planning and implementation of major transport projects which we will propose in the Survey may well extend beyond 1980.

   - The major economic and social impact of such projects is often not fully realized until a number of years after the projects have been implemented, and cost-benefit calculations therefore required an extended horizon.

F. RANGE OF INVESTIGATION

During the Regional Transport Survey, we will pursue all the aims and objectives as stated, and examine the topics, questions, and requests contained in the Terms of Reference. However, as posed in our proposal to the ADB and confirmed during the Inception Period, it is neither desirable nor possible to apply equivalent research effort to all matters listed for examination in the Survey.

The Terms of Reference recognize and stress the need for the Survey to be realistic and selective in its approach if it is to escape a "time scale for the study which, in terms of the requirements of the Regional Transport Survey, might detract from the immediate practical utility of the Survey."

In order to be selective and develop a plan for the Survey we have, therefore, made a preliminary assessment of the areas which appear to warrant investigation and on which attention should be concentrated. This has permitted the definition of the methodology in Chapter IV and the program in Chapter V to complete the Regional Transport Survey.

As the Survey progresses it will be necessary to revise this assessment. Nevertheless, it is of value here to indicate the range of project areas that are likely to receive attention. The following pages list the probable areas of study.

Air Transport

- Assessment of airline cooperative programs which have the potential of improving operating efficiency and reducing cost by such efforts as the use of compatible equipment, common maintenance and overhaul facilities, spares pooling, collective training and development of a regional airline, operating intra and/or extra-regionally.

- Assessment of the viability of the regionally based airlines in terms of their ability to expand to meet the growing demand for their services, and to operate competitively

with extra-regional airlines. Particularly important is the effect that new technology has on financing, management, availability of skilled help, and network flows.

- Assessment of the economic impact of the airlines as industrial undertakings in terms of balance of payments, employment, development of technical skills, development of support industries, etc.

- Assessment of both international and major domestic airports in the light of improvements needed to handle aircraft, passengers and cargo more efficiently, to increase safety of operations (night lighting, radio beacons, air traffic control, etc.), to prepare for the requirements of new technology aircraft, and to increase capacity and access to handle projected traffic. This will be considered on a regional-system basis taking into account projected demand. The feasibility of such concepts as a gateway airport will be considered.

- Examination of new and improved domestic airport networks in developing areas where currently there is insufficient or no air transport service. The domestic airport systems will be examined in the light of competing forms of transport and their relationship to the international airports. Upgrading domestic systems to provide safer, more efficient service will also be considered.

- Determination of limitations and requirements of navigational aids, communications facilities, air traffic control, search and rescue procedures and similar other regional air transport support functions.

- Assessment of potential organizations and programs to manage, operate, train, finance and perform research for some or all of the infrastructure requirements of the region.

Shipping

- Development of a coastal shipping feeder system including investigations of ideal vessel types.
- Investigation of the total Southeast Asian shipping system describing an optimum system for short-haul cabotage or internal system, feeder and external services including the role of national flag carriers.
- Cargo flow analysis and forecasts which are exercises toward defining the market. Cargo classified will be made in terms of suitabilities for containers, pallets, drybulks liquid bulks, and break bulks.
- Sensitivity analysis of a number of important commodities in the export trade of the region in terms of cost in the various parts of the transport system from production to market.
- Analysis of control mechanisms, including an investigation of freight rate tariffs, safety arrangements and schedules, and suggestions for their updating.
- Investigation of the transport environment relating Southeast Asia to the worldwide system. We will examine, for example, the role that the region should play in the face of new giant consortia in container shipping.
- Design an investment strategy plan in shipping.
- Investigate implications for the region's shipping of a regional shipbuilding industry.
- Investigate the establishment of training facilities both for ship personnel and management.
- Suggest improvements in navigational aids.
- Development of a regional research institution to collect and retain basic data which will assist the decision-making process.

Ports

- o Evaluation of the present capability and adequacy of the major international and intra-regional ports as transfer links between road and rail transport and the various types of waterborne transport.

- o Evaluation, on the same basis, of those auxiliary ports that are of significant importance for coastal feeder services to the major ports.

- o Assessment of the need for port development and improvement in order to:

    - Meet increasing transport demand

    - Reduce costs to shippers

    - Improve the service level

    - Adapt to new ship types, cargo handling techniques and unitized freight services.

- o Analyses, in combination with land transport studies, of potential ferry connections.

- o Analyses, if indicated by the land transport studies, of potential port development in new locations.

Land Transport

- o Examination of potential integration of transportation systems involving rail, highways, and ferries on a regional basis, taking into account the benefits of new technology.

- o Define the future role of rail transportation in the movement of passengers particularly in densely populated areas, e.g., Java.

- Examine the requirements for access and feeder roads to expanding and developing regions including tourist resorts and to other modes of transportation, e.g., airports and ports.

- Review the actual cost and performance of land systems and analyze opportunities (in respect of missing links, policy barriers, management and organization factors, and deficiencies in facilities or in their condition) for improved efficiency, capacity, and lower transport costs or lower prices to shippers.

- Identify improvement and expansion projects as a basis for recommendations for investment programs.

- Examination of inland waterways as feeder systems to coastal and ocean shipping and as alternates to land transport.

Economic Development

The economics studies will basically serve two functions: (a) to delineate the areas of development which appear to offer the greatest potential for meeting the goals of this Survey; and (b) to provide analytical support for assessing the transport opportunities. To these ends the studies will include:

- Forecasts and analyses of the major economic indicators of the Region, appropriately disaggregated;

- Investigations of opportunities in the various economic sectors throughout the Region.

In determining the areas to be studied and the focus of these investigations, we will pay primary attention to the role played by transportation in the development of the sectors. The projects will be evaluated from the point of view of their contribution to regional development and balance of payments, and to economic modernization by the improvement of efficiency and the introduction of new technology. Announced national goals and aspirations will also be taken into account.

The extent to which transport systems financed with public funds play a role in the development of the several economic sectors

was important in determining the attention that we expect to give to each sector. Tourism and agribusiness, for instance, are more closely related to publicly financed transport and infrastructure developments than are the remaining sectors. Thus, although mineral extraction will be of great importance to the Region, it is of less direct interest for transport-related research than tourism. Taking into account the above considerations, we have concluded that the tourist and agribusiness sectors will receive the greatest attention in our investigations. Forestry, manufacturing, fisheries and mining will receive less attention.

III. THE STARTING POSITION

This chapter presents some of our judgments on the data base upon which the RTS will construct its analyses and conclusions regarding transport investment in the region. It also touches upon our initial impressions of the state of the economy and of the present transport system. What we detail below represents in brief the point of departure for the investigation in depth which we plan to undertake in the RTS.

A. THE DATA BASE

The work to be done in the Survey depends on the availability and quality of the existing information. During the Inception Period we have compiled and examined a library of basic data. Although we concentrated on collecting data needed for describing the starting point, we also gained an appreciation of what data needs we can expect to satisfy. Our main purpose, however, was to determine whether or not the information available or clearly attainable was adequate for our needs.

1. The Adequacy of the Data Base

The data base is generally adequate but there are gaps. The gaps which we have been able to identify are of two kinds:

a. those which we believe can be filled and where we have not yet exhausted all available resources (many of these sources may be in our library but not yet fully scrutinized);

b. those for which we believe no reliable data have ever been collected.

To solve the former problem, we shall pursue our investigation of primary and secondary sources during the Interim Period and Second Stage of the RTS and also rely on the counterpart staffs and other contacts in the Region to assist us. The latter problem forces us to draw

upon our judgment and experience and on interviews with government officials and private businessmen in all the RTS countries and also on discussions with officials of ADB, ECAFE, IBRD and other relevant international organizations. During the Inception Period, we have conducted many of these discussions and interviews.

There are careful and reliable compilations of import and export trade statistics and there are estimates of agricultural production based on little more than casual observations. Statistical data relating to shipping, railway and airline operations and finances are available for most countries and a number of descriptive studies of transportation facilities have been made by consulting and other groups. Reports concerning economic and transport opportunities for development have provided additional perspective on the capabilities of the area by generating new supplementary data. In some cases, these reports have filled data gaps by sample surveys; in other cases, the reports have provided valuable judgments and analyses of existing data. A number of important surveys of the Region have yielded useful information about the data which supplements the primary statistics. We believe that most of the sources of information have been identified during the Inception Period and the key ones have been subjected to an initial review. A system for cataloguing and cross-referencing has been developed and applied. Where sources of information are known but not readily available, steps have been planned for tapping them. Some sources are restricted because their reports have not been officially released but the gist of the conclusions has been discussed with us. The libraries of the ADB and of other international agencies throughout the region are a valuable source of information.

ECAFE compilations of Asian statistics, special studies and country economic growth projections, IMF financial and balance of payments statistics, IBRD reports, and UNCTAD's trade studies will provide important inputs for the general economic studies. Also, the Japan Economic Research Center's preparatory RTS study "Economic Development of Southeast Asia," which has already made an important contribution to our thinking and program planning, will continue to be a source of factual and procedural guidance throughout the program.

The data and other information collected so far have been checked for adequacy with respect to coverage and supplementary analysis. To a lesser extent, we have also reviewed the data for reliability of source. The quality of the data varies widely and some of the information must be re-worked.

2. General Economics

The general economic data base for the Region does exhibit gaps which present difficult but not insurmountable problems. For each of the Survey countries, time series data have been collected, where possible, for the period covering 1955 to the present, for the following economic indicators: Gross National Product; Gross Domestic Product by Sectors; Demographic Characteristics; Principal Exports; Principal Imports; Commodity Flows; Balance of Payments; and others.

We have prepared summary tables for the purpose of reviewing the comparability of these data on each of the countries, identifying the gaps and gaining an appreciation of the quality of the data. These tables indicate that in Malaysia, Thailand and the Philippines the data are sufficient for our immediate needs and are reliable. The data for Singapore and Laos do not extend back far enough for reliable time series analysis although recent statistics on Singapore are extensive. In the case of Vietnam the effects of war conditions provide little basis for meaningful conclusions or projections. Indonesia's data must be treated with appropriate care if its period of pronounced economic instability is to be taken into account. In addition to these seven RTS countries, basic data have also been collected for Brunei, Cambodia, and Burma.

3. Resources and Production

We have also identified and collected information concerning the resource and production characteristics of the Region. These statistics, reports and surveys will help us to define the starting point of our sector studies. The extent and quality of background information concerning the major sectors varies widely from country to country. In some instances, very little information is available; in others the information and the analyses are highly sophisticated. We have set up a reference system which enables us to determine whether or not the questions fundamental to an analysis of sectoral opportunities can be answered and, if so, where these answers can be found. This system has enabled us to locate data gaps and has provided a good basis for identifying the areas of greatest opportunity. The reference system will also be a valuable source of information for the specialists studying the several sectors, and for future sectoral analysis of the Region.

The fields of resources and production were divided into agribusiness, fisheries, forestry, infrastructure and other services, manufacturing, minerals, and tourism. The questions addressed to each of these fields in each country were grouped under basic sectoral categories including economics and operational framework; policy-making and implementation, which includes fiscal policy, and national and sectoral development plans; tariff and customs policies; and international trade relations, which include trade associations and trade agreements, foreign aid, foreign investments and others.

We have reviewed and annotated the major sources of information. Our purpose was a preliminary assessment of the value of specific second stage work in these sectors during Stage II.

An initial review of the information on the different economic sectors can be summarized as follows:

- In the field of agribusiness, a wide range of reliable data exists for each of the RTS countries. While there are variations in the length of the time series among the countries and in the intensity with which certain sub-regions have been studied, the general nature of the information is good. Many studies, such as the ADB's Agricultural Survey, have recently been conducted and these offer a substantial analytical background and provide many recommendations which will prove to be valuable in the Survey.

- Data concerning the infrastructure, the fisheries and the forestry sectors in the Region generally appear to be available and reliable but not as adequate in terms of time-coverage and scope, depth, or number of analytical studies.

- For the manufacturing sector, existing data are limited. In most countries of the Region, manufacturing has been undertaken on a limited scale and historical statistics are consequently not meaningful as a base for projection into the future. Our present analytical base will be reinforced by the industry surveys to be conducted by ECAFE.

- o Information about the extractive industries in the Region appears to be deficient in terms of either length of time series or analytical studies. The quality of the geological information available to us at this time varies greatly among the countries and within them. Thailand and the Philippines have good information available.

- o Tourism is a relatively new field and information on past trends is not as readily available. Several studies, however, have been or are soon to be undertaken concerning potential development of tourism in the Region.

4. Transportation

Transportation data collected during the Inception Period have been similarly assessed. Three categories of information have been sought for each mode in each country.

a. Organization, Physical Facilities and Development Plans

Recent studies, surveys and plans developed in most of the participating countries are of great value to us. Surveys covering all modes of transport have been made in Malaysia, Thailand and the Philippines. For Singapore, the corresponding information is also available, but not put into a comprehensive framework. In Vietnam, all modes have been surveyed intensively. The Mekong River transport and the bridge connection between Laos and Thailand have been studied, as has the entire Mekong River system from Thailand-Laos through Cambodia to Vietnam. However, these studies have not yet resulted in a concrete plan of action. In Indonesia, the highways, railways, Garuda Airlines, and the coastal/inter-island shipping system are being studied. For the highways and for Garuda, improvement programs have already been formulated and are being implemented. A port survey is expected to be started in 1970.

We have not yet been able to review these studies, surveys and plans in depth, but we conclude from our interviews that most of them will provide an adequate base for evaluating the present transportation systems and the existing plans for their development.

The major data gaps that have been identified for transport pertain to information on airports and on all but the six major seaports in Indonesia and to transport planning data for Laos. It would also appear that the data on potentially important coastal ports in Southern Thailand are inadequate.

b. Traffic Data

Traffic data are generally available for air transport, and are available, or can be made available, for railways, ports and shipping. Traffic data for Indonesia may be limited. For inland waterways, regular statistics on traffic are not available, but enough material exists to permit rough estimates of traffic volume to be made, at least for Thailand, Laos, and Vietnam, where inland waterway traffic is important.

For highways, Average Daily Traffic figures are generally available. Complete traffic surveys, including origin/destination analyses, have been made for Singapore, West Malaysia, Thailand and the Philippines, and are in progress in Indonesia. For Vietnam, of course, present traffic data, even if available, are of little use for planning purposes, since the entire traffic pattern is distorted by war conditions.

c. Transportation Costs

The rates paid by the users of the transportation system generally are available, or can be obtained, for air, rail, ports, and shipping. For highway and internal waterways, the rates paid by shippers and passengers are generally available for publicly controlled enterprises only; the rates charged by private carriers will have to be determined by interviews.

The rates paid by shippers do not always reflect the true economic costs to provide the service. To establish whether the rates to shippers reflect the economic costs, an analysis of the financial accounts of the carriers and the agencies providing the infrastructure will be required. It would appear that the data base of this analysis in some countries would be inadequate. When data is not available, it may be necessary to use estimates based on the performance of comparable carriers serving the same general territory and for whom cost data are available.

B. TRANSPORT CHARACTERISTICS OF THE REGION

1. Introduction

During the Inception Period we have not confined our work to an assessment of the data base. We have also devoted a part of our effort to acquiring a preliminary understanding of the existing transport network in the Region. We have reviewed the studies available to us, and have discussed the facilities and organizational structure with government officials in the participating countries. The characterizations offered in the remainder of this section represent judgments conveyed to us by others; our own acquaintance with the transport systems is too brief to permit us to reach any firm conclusion. These characterizations do, however, represent initial assumptions which remain to be tested by further study and observation during the Interim Period and during Stage II of the Survey.

Without an economic assessment, it is impossible to say whether or not the existing transport facilities are adequate to the Region's present needs, but there appears to be no acute deficiency current over the whole Region. There are evidences of technological obsolescence, deficiencies in administration and operation, and of a scarcity of skilled and semi-skilled personnel. In some areas, modern transport is either lacking or at best, inadequate to support the needs of the area.

There is a need for improvement, extension and modernization of transport facilities of all types, and for planned integration of different modes. There is also a need in certain areas of the region to remedy serious physical inadequacies, and in others to remove impediments to growth caused by high operating costs. An important purpose of the RTS, however, will be to discover and develop transport projects that will induce economic growth by linking inaccessible resources with potential markets at low costs.

2. Transport Capabilities

Preliminary views with respect to the present transport capabilities of the various modes are as follows.

a. Air Transport

In all of the RTS countries, air transport plays an important role in the handling of external and intra-regional passenger traffic and a small, but increasingly important, role in the transportation of high value commodities.

The Region is served by 31 international carriers, seven of which are based in the Region, and by a number of purely domestic airlines. Regionally based carriers provide about 25% of the external flights and about 85% of intra-regional international flights. All domestic flights are provided by national carriers.

Although Hong Kong is not officially a part of the RTS region, it is an important connection and distribution point and consequently, must be considered in our studies. Of the 597 flights weekly in and out of the region, 256 connect with Hong Kong. Of these 102 (40%) are provided by regionally based carriers.

In addition to scheduled services, there are a growing number of chartered flights to the Region from Europe and North America. These carry tourists, travelling either as affinity groups or on the basis of inclusive tours.

The regionally based international airlines appear to be reasonably well financed organizations with modern aircraft and competent management. To some extent, they have benefited from ties with airlines based in Europe and the United States, from which they obtain both managerial and operating assistance. In fact, a deficiency of skilled and semi-skilled personnel as well as the lack of sufficient capital compels the lines to have overhaul-maintenance of jet aircraft performed under contract with airlines based in Western countries. These regionally based international airlines also handle most of the domestic traffic in their home countries except for Thailand. Most countries also have domestic carriers, which are in general small and financially weak.

Because of its position in the global air-route network, the RTS area is well served with flight connections to and from countries outside the region. These flights also provide a substantial amount of intra-regional international capacity, which combined with other flights originating and terminating within the region, provides adequate service

for the present demand. However, fares within the region are traditionally higher than those in the western world. The level of domestic service varies; some appears to be adequate while other services would be considered unsatisfactory in terms of the latest technology.

With respect to ground facilities - airports, navigational aids, and communications - a number of major shortcomings have been outlined in broad terms in the International Civil Aviation Organization (ICAO) plan for Southeast Asia (1968). Apart from safety considerations, the deficiencies may be preventing the development of air transport in the area in the most efficient and economic manner, although their consequences have yet to be quantified. Even where ground facilities are adequate for present traffic, undesirable constraints are likely to become apparent as traffic increases during the coming years. These could influence not only the intra-regional transport but also the volume and characteristics of transport between the region and other parts of the world. The quality of domestic airport facilities is mostly substandard. Many important domestic airports lack even such fundamental equipment as runway lights and radio beacons. Of the deficiencies in the regional air transport system, those in ground facilities constitute the major shortcomings and will probably require substantial investment.

b. Maritime Transport

The Southeast Asian region has always been and will, in the foreseeable future, continue to be highly dependent on maritime transport. Practically all external cargo and a substantial proportion of the intra-regional trade move by sea. It is estimated that the region accounts for more than 6% of the world's international seaborne cargo movements and that the shipping costs amount to about $1.0 billion per year. With the exception of Laos, all countries covered by the survey have direct access to the sea.

By far the largest proportion of cargo movements are external although there is an important entrepot trade through Singapore from Indonesia, Malaysia, Thailand, Vietnam and Cambodia. There are also some movements between the major ports of the region. Although there are national flag shipping companies in the Philippines, Indonesia, Thailand and Singapore (and one planned in Malaysia), their capacity is limited in relation to total transport demand, and by far the largest proportion of the region's cargo is carried by vessels owned and operated

from outside the region. Most of the companies, including some regionally based ones, belong to European-dominated conferences. Capacity is adequate. Shipping people claim that there always has been sufficient tonnage to carry any goods that it is desired to move and the service level is satisfactory, at least for the major ports. Certain countries have expressed reservations with regard to the equity of freight rates, however. Goods from smaller ports often have to be transshipped at major ports which, with only break-bulk facilities available, adds significantly to shipping costs.

Coastal and inter-island services are basic and indispensable elements of the transportation systems of Indonesia and the Philippines and very important elements for West and East Malaysia, Vietnam, and Southern Thailand. Indonesia and the Philippines have too many outdated and badly maintained vessels. This has led to operational inefficiencies and general deterioration of services. The economic activities in many smaller island or coastal communities are seriously hampered by the lack of regular scheduled sailings and, in Indonesia, the disorganization has gone so far that some cargo that traditionally moved via inter-island steamers has reverted to sailboats. Malaysia and Thailand have insufficient domestic coastal shipping capacity, but the shortage is taken up by ships operating out of Singapore, and the service level is believed to be reasonable. An estimated 70% of the trade between East and West Malaysia is handled by the Singapore-based Straits Steamship Company. Vietnamese coastal shipping seems to suffer from insufficient capacity. However, it is difficult to evaluate what the shortage will be until the country returns to peacetime conditions.

c. Ports

Foreign trade in Southeast Asia historically has evolved from the sea, and port development has generally followed closely after. The region is well endowed with protected anchorages and natural ports. Where traffic has increased to such proportions that cargo handling over the side of vessels to or from barges and lighters has become uneconomical, fixed facilities have usually been provided. As a rule, the development of ports has catered to the needs of traditional shipping, and innovations by the ports themselves have been rare. A notable exception was the dredging of the Bangkok Bar in 1953, which radically changed the flow pattern for rice exports and undoubtedly reduced transportation costs significantly. Most of the major ports in the region appear to be adequately equipped to serve the need of present traditional shipping, although maintenance (including maintenance dredging) is a serious problem in some of the countries. Nevertheless, many of

the ports which apparently have adequate physical facilities are considered slow and costly by the shipping industry. This view is often reflected in abnormally high freight rates. The resulting loss to the national economies has yet to be quantified, but may well be significant. As the total cost of shipping in the region's cargo has been estimated at some $1.0 billion per year, even a modest reduction in freight charges would benefit the countries sizeably. It is acknowledged by most of the authorities responsible for port operations in the region that organizational and institutional constraints are as important as physical constraints and perhaps great efforts have already been made to reduce turn-around time for ships and handling costs, to speed-up sorting and customs clearance of goods, etc. Some countries have had notable success while others have not.

Neither the seeming adequacy of physical facilities for conventional shipping, nor the fact that a certain increase in this traffic can be accommodated by organizational improvement, precludes the possibility that heavy investments in port improvements may be needed during the coming years. Rapid changes are taking place in the technology and structure of shipping elsewhere in the world, and unless the region adapts its ports to these changes, it may, in a not too distant future, find its shipping costs unnecessarily high. The trend is towards specialized vessels for commodities where the volume is sufficient and towards larger and faster vessels for long distance general cargo transport. These costly vessels can only call at a limited number of well-equipped ports, and must be backed by an efficient feeder service from other ports. Singapore and Malaysia have taken cognizance of this trend, and are providing facilities for terminal and feeder services, respectively, for the coming large container ships. For certain major ports, notably Bangkok; Manila, and perhaps Singapore, land access by road transport is time consuming and expensive because of traffic congestion in the urban areas in which the ports are located. Substantial investments will be required in the future, either to remedy the congestion or to relocate port facilities depending on road access.

d. Railway Transport

While conditions vary somewhat in each country, railway transport in the RTS area is generally poor. All railways in the region, with the possible exception of the State Railway of Thailand, have in common the problem of financial difficulties. Operating revenues are insufficient to meet even the cost of proper maintenance, let alone new

capital investment and, as a result, the quality of service is declining to a level where traffic is lost to other inherently less economic modes. Rate increases without an improvement of service would, for most lines, cause a further loss of traffic. Since the railway system is capable of providing a wider range of transport services at lower economic costs than some competing modes, it may be possible to justify the allocation of funds for financing carefully selected capital improvements and these the RTS will consider.

In Indonesia, the Javanese system provides good coverage and is an extremely important carrier of passengers. In Sumatra, the system is disjointed and carries principally freight to the ports. Both systems are in a bad state of disrepair.

The West Malaysian Railway provides good coverage of the country, operates a line into Singapore, serves the major west coast ports and connects with the State Railway of Thailand. It is not, however, sharing in the economic growth of Malaysia. Competition from highway transport is keen, and the railway is hampered by financial problems.

The State Railway of Thailand provides good coverage of the country, connects with the Malaysian and Cambodian Systems and operates to the Laotian border just south of Vientiane. There is a proposal for extension of the line to Vientiane once the planned bridge across the Mekong River has been constructed. The Thai Railway seems to be a successful operation; both freight and passenger traffic are increasing.

The Vietnam Railway System is basically well planned and organized, but because of war conditions, more than half of the system is out of operation, and traffic is only a fraction of what could be handled during peacetime.

The Philippine National Railways provides fairly good coverage of Luzon, particularly the southern sector. However, the railway is in poor financial and physical condition.

The Philippine Railway Company, controlled by the Development Bank of the Philippines, operates on Panay. Its main cargo is sugar cane.

e. Highway Transport

In Southeast Asia, as everywhere else in the world, highway transport is certain to play an increasingly important role in the transportation system. Today, the region presents examples of all stages of highway development from a limited length of high standard roads through a considerable length of lower class roads and down to primitive dry weather roads. A significant proportion of the area and its population is not served by motorized transport. During the coming years, highway transport will undoubtedly require and receive large investments for road building and maintenance, and for the associated substantial expenditures for acquisition and maintenance of vehicles.

In Singapore, West Malaysia and Thailand, highway development for present and potential demand is in progress. To a great extent, this has been financed by foreign credits (e. g., from the IBRD) apparently readily available for planned and economically justified expansion. The plans include the improvement and completion of the Asian Highway network lines.

In Vietnam, considerable highway construction has taken place during the war, but, on the other hand, elements of the network, particularly bridges, have suffered extensive damage. At present, the highway connections to Cambodia and Laos are closed for commercial traffic.

In Laos, highway transport at present is restricted to the agricultural plains around Vientiane, and, even here, road conditions are such that the farm-to-market transport is basically provided by animal-drawn carts.

In Indonesia, the main trunk transportation system consists of coastal and inter-island shipping. The role of highways has been to provide feeder service to and from the ports. However, cross country transportation is of great importance for the major populated islands - Sumatra, Java-Madura-Bali and Sulawesi - which in the past had reasonably well-developed highway networks. In recent years, the highways have fallen into disrepair. A substantial rehabilitation program, partly financed by IBRD, is now in progress, to be followed by a program to upgrade the system to standards required for modern trucks.

The Philippines also has an acute highway problem; but considerable progress has been made during recent years in modernizing and rehabilitating the network. The planned Philippines-Japan Friendship Highway will give the country its first north-south trunk highway.

f. Inland Water Transport

Inland water transport is of vital importance to Laos, and of great significance in Thailand and Southern Vietnam. Indonesia has a certain amount of inland water transport, notably in Sumatra and Kalimantan. The system in Thailand is extensive and carries large quantities of goods. There is a question, however, as to whether the traffic will continue to move via inland waterways in face of the increasing competition from highway transport, unless relatively large investments are made to rehabilitate locks and to dredge canals in order to permit the use of larger craft. The system in Vietnam is also extensive and was, before the hostilities started, extremely efficient. It has been severely damaged by war operations; much of the fleet has been sunk and many canals are blocked. In Laos, all exports and imports move on inland waterways, either along or across the Mekong River. A series of waterfalls and obstructions prevents vessels from reaching Laos from Phnom Penh and the sea, and vessels operating within Laos are limited to about 70 tons dead-weight. A large proportion of the cross-river traffic will be diverted to road or rail if the planned bridge between Nong Khai and Vientiane is constructed.

C. ECONOMIC CHARACTERISTICS OF THE REGION

The basic economic characteristics of the Region which we believe will impose a strong influence on the form and direction of economic development in the Region over the next two decades are listed below.

1. The countries in the Region have certain common physical and geological features, similar histories of colonial rule (except for Thailand) and comparable economic problems. These common characteristics of the countries have been largely responsible for creating competitiveness and little complementarity within the Region. This can be seen by the

fact that the countries rely on a small group of similar raw materials for earning foreign exchange and that limited intra-regional trade exists. In fact, after excluding transshipment through Singapore, recent trade statistics in the Region indicate that as little as 7-9% of trade in the RTS countries is intra-regional. What is more, this mutual trade is dominated by bulk commodities, much of which is destined to be re-exported to other parts of the world.

2. The economic links earlier forged with the metropolitan powers remain strong, and political reorientation has not been accompanied by comparable economic reorientation. Many of the earlier trade, financial and transport relationships with Europe and the United States remain undisturbed and that reorientation which has occurred has not been in the direction of much more intra-RTS trade but towards more trade with Japan and other countries such as Australia and New Zealand. Foreign exchange to finance the import of essential capital goods, industrial raw materials and a wide range of consumer goods continues to be earned by the export of raw materials - principally rubber, tin, timber, copra and sugar - which for the most part are transported in ships that are foreign owned, operated and serviced. Essential capital imports both private and governmental with attendant technological know-how, continue to flow for the most part from traditional sources.

3. The countries of the Region have begun to accept the importance of economic integration and are prepared to engage in joint ventures where each country will benefit more by such cooperation than by individual action. Although the ties to the world outside the Region remain strong not only for markets for the Region's resources but as a source for its capital and capital goods, there appears to be an increasing recognition of the limitations that this situation places on the development of the Region and an appreciation of the fact that cooperation among themselves will encourage mutually beneficial economic growth.

4. The richness of the Region's natural resources forms the basis of its potential for economic development. The area abounds in resources which have been developed to varying degrees.

In the case of agriculture, the Region's favorable physical and climatic conditions provide the opportunity for not only being almost self-sufficient in food but for employing a substantial part of its labor force and earning a large share of its foreign exchange. Fish and forest resources are generally developed far below their potential. Large areas of timber have not been explored or exploited, and in some areas fish production is estimated to be only at 15% of its possible level. Minerals are also distributed widely throughout the Region and the industry is very unevenly developed.

5. Although great distances separate the Region from major world markets, they do not prevent it from being highly competitive throughout the world. Market opportunities can be expanded not only abroad but within the Region as well. While the Region is a leading world supplier of many products such as copra, tin, sugar, petroleum and rubber, maintaining or expanding its share in international markets will require greater efficiency and increased production.

6. Economic growth and development in the Region are largely dependent on the support of adequate transportation and other infrastructure. Although the role of infrastructure varies among the sectors and the adequacy of existing systems among the countries is not uniform, improvements in operating efficiency and expansion of present facilities are vital to the economies of this Region. There are industries whose development does not directly require an expansion of transport facilities, but in order for the Region to grow and develop and achieve maximum benefits from these industries, it must be prepared with policies of sound infrastructural planning.

IV. METHODOLOGY

GENERAL

A prerequisite to covering the scope and achieving the goals of the Regional Transport Survey is to develop the method of approach to the Survey. This is described in this chapter and developed into a detailed program for the Survey in Chapter V.

It will be seen that the approach has been designed:

- with a basic framework which will enable transport and economic factors to be interrelated logically and continuously so that a balance between economic needs and transport development can be maintained
- with a cyclical nature which will permit the balance between the economy and transport provisions to be checked at several stages during the time of the Survey and which will facilitate the identification of regional opportunities (both in transport and other areas)
- to include the necessary range of techniques and approaches which will ensure that the scope of the Survey is covered efficiently and that the Bank is provided with the requisite data, analysis, guideline, framework and recommendations.

Each of these aspects is considered in greater detail in the following pages.

A. BASIC FRAMEWORK FOR THE SURVEY

In order to meet the objective of the Regional Transport Survey and to provide a basis to assist in stimulating the general economic development of the Region, it is important to adopt a systems approach to the Survey and interrelate transport with the economies of the Region.

As a means of achieving this result, the various economic transport and associated studies to be conducted as a part of the RTS have been designed to fit into an overall logic framework. This can conveniently be thought of as comprising four steps as follows:

1. Assess the status and scope for development of the economies and the transport systems in the Region. From an understanding of the present position and estimates of the potential investments and other actions that could be pursued in the Region, this step will lead to a broad evaluation of transport, infrastructural, and other investment requirements necessary for economic stimulus.

2. Determine the most suitable transport system for the Region to satisfy the transport needs of Step (1). This will be based on an understanding of the potential level of service of the transport system, the costs and other factors involved in its development and the appropriate economic and technical criteria. The answers could indicate the need for minor modifications or for major developments or that no change is needed at all.

3. Schedule the resources necessary to best meet the economic and transportation requirements of Steps (1) and (2). In this resource allocation step, the costs, benefits, and other factors associated with the various proposed changes will be compared and phased through time to meet the projected changes, growth rates, and other requirements of the system in ways which best satisfy certain specified criteria. One output from this step will be a statement of the transport capacities and costs necessary to meet the specified conditions.

4. Compare the outputs of (3) with the assumptions used in the evaluation in Step (1). Significant differences will require a re-evaluation of the Region's potential development and hence re-cycling through Steps 1 - 4.

In practice, these steps will naturally overlap to some extent. For example, consideration may be given to the most suitable transport system while the likely future needs are being assessed. Work on several of these steps will, at times, proceed concurrently during the Survey.

Nevertheless the steps reflect the basic requirement that the transport system should be developed and modified to meet the needs of the Region's economy and represent the essential framework for our approach to the Survey.

It is worth noting that the results of each step will be examined by the entire Team before being used as inputs to the succeeding step. In this way, experienced judgment will be brought into play, to prevent distortions that might arise from purely mechanical applications of the logical process.

We expect the entire process to create new transport network proposals as well as evaluate existing proposals.

B. CYCLICAL NATURE OF THE SURVEY

The approach we propose to adopt in the Survey is to progress through the steps outlined above in three distinct cycles. The first of these is planned to be completed by approximately the end of April 1970, the second by the end of October 1970, and the third by the end of January 1971.

In the first cycle, we will develop the general economic survey of the Region together with preliminary status evaluations of present transportation conditions and identify possible opportunities for their improvement. Forecasts will be prepared for economic growth in the Region. The present and expected future capacity of transport and other resources to handle this forecast level of economic activity will then be broadly assessed. The Interim Reports - the General Economic Survey and the Transport Status Reports - will be issued at the end of the Interim Period.

This first cycle will extend beyond the time of the Interim Period to provide an early appreciation of the interactions of transport and the economy, and result in the definition of changes and development opportunities warranting further analysis. This will lead directly into the more detailed second cycle.

The time for the second cycle will be approximately six months. The principal effort will be devoted to completing sector analyses and investigating specific projects. Industry specialists will be drawn on and more precise data will be developed to permit reasoned analyses to be made of the impact of transportation on the economy and its growth. This information will then be used to review the allocation of resources estimated in the first cycle and check the effect of changes in cost and other factors on the Region's development.

The third period of cycling will be of relatively short duration and might be traversed a number of times. In the first place, inconsistencies developed as a result of second cycling will be eliminated. In addition, a range of action programs for potentially useful projects in the Region will be evaluated under different sets of criteria and constraints.

Benefits of the Approach

The benefits of this approach are that it will provide:

- An early evaluation of the impact of economic growth on the region's transportation system and vice versa
- An early identification of potentially important opportunities for investment
- A sound basis from which to define the detailed sector and modal studies (with a clear understanding of their individual importance in the overall survey)
- The opportunity for a re-appraisal of the economies and the transportation aspects at at least two distinct points in the survey
- A facility arising early in the Survey to assess the impact of individual projects identified by the Team, the ADB or the participating countries
- A clear indication at all stages of the project of the general direction of the Survey's findings.

Results

Our approach has been designed to provide the essential requirements specified by the Bank and defined in Chapter II. These are:

- A status report for the Region
- A forecast of developments in the Region

- A framework to assist the Bank in evaluations and decision making
- An action program indicating the most appropriate investment and other actions to meet nominated sets of criteria and constraints
- A statement of the scope for research and other institutional developments in the Region.

These results will be developed approximately sequentially.

In terms of phasing, the status report will be developed in the first cycle (General Economic Survey and Preliminary Modal Reports). The forecasts, resource allocation framework, finally developed action program, and the institutional recommendations will then be developed and refined throughout the Survey finally emerging after the third cycling period at the beginning of 1971.

Details of the program to be followed and its broad phasing throughout the Survey are indicated in Chapter V of this Inception Report.

C. DETAILED METHODOLOGY

The methodology necessary to complete the Survey will take various forms. Specifically, the Survey program will involve:

- Collection, collation, analysis and validation of data
- Inspections by experienced observers
- Development of conversion factors for relating cost, quantity and performance data for selected commodities or regions
- The use of experienced judgment (particularly for the identification and selection of appropriate projects for action programs)
- Organizational analysis
- Practical methods of computer use.

The application of these approaches to specific tasks is detailed in Chapter V.

The Survey will make selective use of proven methods of analytical modelling, particularly for:

- o Economic forecasting
- o Transportation network planning
- o Resource allocation.

We consider it unrealistic and unnecessary to endeavour to integrate these three into a total planning model for the Region. There would be so many factors and uncertainties involved in describing the general influence of transport and other investments on the growth of economies that any such model could be enormously time consuming and unreliable.

It is, however, practical and valuable to apply modelling techniques in the three specific areas of the Survey where complex interrelationships and computational difficulties need to be overcome. This particularly applies to those stages of the RTS which are concerned with:

- o The development of national and regional forecasts
- o The selection of the most satisfactory transportation networks from a range of available alternatives
- o The allocation of resources through time, to meet the resource demands from competing projects.

We therefore propose to develop models to assist with the first and third of these, and to direct these techniques to improve transportation network planning as determined to be necessary during the Survey.

The fundamental methodology involved in the development of these approaches will comprise:

- o Definition of the principles involved
- o Definition of criteria and constraints
- o Specification of a theoretical basis to describe the relationships

- o Development, as appropriate, of computational methods for project, simulation or optimization
- o Computation and display of results from the theoretical basis
- o Validation by experienced judgment and analogy with known results.

These will be applied where relevant in the three areas mentioned, each of which is considered in more detail in the following:

1. Economic Forecasting

Purpose

Forecasts of the economic growth of the RTS countries and the analytical framework developed in obtaining these will constitute an important factor in the Regional Transport Study. They should also prove to be very useful elements for the future needs of the ADB, the RTS countries and other groups evaluating future investments and developments.

The initial forecasts will provide the necessary background for the detailed sectoral studies and the transportation evaluations. The analytic framework, on the other hand, will constitute a means of testing the impact of alternative assumptions and possible developments.

It is expected that the future load on transportation facilities will be extremely sensitive to the rate of growth of the RTS economies. In turn, the future rates of growth that will be achieved will depend, to an extent, upon the rate of investment in transportation facilities.

Thus, it will be important to establish thoroughly and as precisely as possible:

- o The rate of growth of the Region's Gross Domestic Product (GDP) and its components
- o The link, at any time, between GDP and transportation
- o The investment component at some prior time..

Approach

The forecasts will be carried out for each RTS country separately. Then, the RTS group of countries will be considered as a whole, and interaction effects will be explored. The results will be converted from U.S. dollar value units to estimates of volume and cargo movement via conversion factors.

There will be four main steps in the forecasting program.

a. The gross product and international trade of each country will be projected to 1990 via growth models individually selected for each country's particular circumstances, but incorporating these common features:

   - o Forecasts of economically active resources and their productivity
   - o Forecasts of GDP by industry of origin disaggregated into such broad groups as:
     - primary industry
     - mining and quarrying
     - manufacturing
     - building and construction
     - electricity gas, water supply, transport and communications
     - tourism
     - other industries.
   - o Forecasts for each of the above industries, broken down into principal commodities and a residual
   - o Forecasts of commodity exports and imports broken down by commodity classes, origins and destinations

- o Demand for each country's exports, and autonomous investment (including aid), which are expected to be independent or semi-independent variables in the growth model.

The work on growth models done by the JERC for the ADB will be utilized in this step.

b. The gross product forecasts will be divided into the main components of total expenditure and balance of payments forecasts prepared. Existing types of aggregative models of RTS countries will be of great assistance in this step, especially the expenditure functions estimated in the most recent ECAFE models reported on by the Sixth Group of Experts on Programming Techniques.

c. The individual country forecasts will be aggregated for all RTS countries and international trade matrices prepared (in both volume and value broken down for origin and destinations for each commodity class). This step will also draw on the preparatory work done by the JERC.

d. The results will be inspected for consistency, and steps (a) to (c) repeated as necessary to achieve this.

Requirements

In the process of carrying out the above program, the following will be required:

a. Special studies of each of the main present and potential export products of RTS countries, covering:

- o World demand and supply
- o Market shares
- o World prices and price structure
- o Elasticity of demand to price, transport cost, component of price, income, etc.

- o Capacity to produce in RTS countries and elsewhere
- o Technological change as it may affect world demand for the commodity, production cost of the commodity, supply of the commodity, etc.
- o Trading relationships between RTS and advanced countries
- o Purposive aspects; e.g., RTS countries' ability to expand their share of world market by achieving greater control over the world marketing of these products.

b. Special studies of flows of investment capital, and aid and RTS domestic capital formation, including:

- o Government plans in RTS countries
- o International aid climate
- o Conditions for foreign companies, partnerships, joint ventures, etc. in RTS countries
- o RTS country incentives to capital inflow
- o The size and character of the industrial base of RTS countries, momentum of industrialization, etc.
- o Sociological and other considerations.

c. Special studies of natural resources and natural resource development in RTS countries including as a resource, the skills of the population, work force participation, etc.

d. Special studies of industrial and infrastructural developments.

Results

In the process of carrying out the above program, the following results will be expected to emerge:

- Forecasts of commodity prices
- Forecasts of the balance of payments of the Region
- Highlights of any major shifts in the locational pattern of industry, agriculture and other economic activities of RTS countries, and consequent effects on the places of origin and destination of trade.

It should be noted particularly that this approach to economic growth forecasting will:

- Draw upon available data (upgraded) and utilize it;
- Take advantage of existing growth models and new models of growth, but will not be mechanistic;
- Provide for the feeding of expert opinion and judgment into the forecasting process;
- Be designed to converge upon a mutually consistent set of results;
- Be capable of distinguishing changes of growth rates over the next 20 years (at four- or five-year intervals).

2. Transportation Network Planning

It will be necessary during the Survey to relate transportation networks to demands for transport services. Where a wide range of alternatives is found to exist, use will be made of simulation or optimization modelling techniques to determine the best transportation system.

In these approaches, existing networks of one or more transportation modes involved will be defined. Changes and alternatives to the modes and networks will be postulated. Demand, capacity and cost figures will be introduced for the modes together with criteria for deciding between the alternatives. Appropriate techniques of simulation or optimization will then be used to define the impact of the possible alternatives on the system in terms of such factors as capital requirements, freight rates and capacity.

From our study of the Region during the Inception Period, we believe that extensive and detailed network analysis is unlikely to be necessary. Depending upon the size of the network (i.e., number of links and transfer points), it may perhaps even be possible to arrive at a solution by logical analysis without using computers. If the network is too large for that, we will plan to utilize standardized and proven methods for optimization - particularly mathematical programming techniques such as linear programming. With further increases in complexity, simulation approaches will be used, or the network will be decomposed into significant sub-networks which will lend themselves to simple analytical methods.

For certain links in the system, such as for particular sections of railroad, it is also possible that it will be beneficial to complete limited simulation analyses under a range of operating conditions in order to select the best set. It is expected that simulations will also be used in the study of intermodal transfers (loading, sorting, storage, etc.).

3. Resource Allocation Model

One of the principal aims of the work in the RTS will be to provide a framework which will assist in selecting projects for action programs.

The decisions, for selection of projects, which will be faced are essentially reducible to choices as to which resources to use and when to use them. It is therefore of key importance in the survey that one of its outcomes should be a resource allocation framework for the Region's continuing use.

In order to provide a major part of this framework, it is proposed as a part of the RTS methodology that a resource allocation model be developed by the Survey Team. This will take the form of a set of manual and computer-operated procedures for comparing alternative projects under nominated sets of conditions and providing priority lists of these projects from which decisions can more easily be made.

Typically, this model would be developed as a form of linear program (LP), which would have the facility for feeding in details of:

- The various demands for goods and people movement at various points in time

- The alternative methods of servicing these demands through existing transportation systems and proposed projects, i.e., changes in the existing systems and developments of a different nature (e.g., pipelines to replace rail transport between certain points)

- The investment benefits and operating costs associated with these alternatives

- The duration of investments and life of existing systems

- The constraints of importance to the Bank, e.g., limits on available funds, policy restrictions on competitive projects, controls on developments in particular geographical or administrative areas in any period of time, and technological or other constraints which might be imposed on individual projects or the action program as a whole

- The alternative criteria against which the Bank needs to make decisions; e.g., return on investment, net present value, or return over some specified period of time.

With existing versatile computer packaged programs for LP, these factors could be interrelated and that combination determined which best fitted the nominated criterion. Several computer runs would provide answers to alternative sets of situations which the Bank could consider and subsequently use in forming its decisions on action programs in respect of specific projects.

It should be noted that many of the relationships encountered in the Survey can be expected to be non-linear. These could require the use of other techniques of mathematical programming including dynamic, quadratic or integer programming. These techniques will be used as appropriate. However, in our experience, it is probable that the normal approaches of linear approximation will provide answers sufficiently close to optimal so that no further refinement will be required.

This application of proven resource allocation approaches by the Survey Team will provide a practical and realistic tool for use during the RTS and on a continuing basis for the Bank's future evaluations.

In this respect it should be noted that although it will be specifically developed to meet the requirements of the transportation sector, the principles and even much of the detail of the model will be directly applicable to other resource allocations situations with which the Bank is concerned.

D. SUMMARY OF APPROACH AND METHODOLOGY

From the foregoing, it can be seen that the Survey Team will use and direct a range of methodological skills in satisfying the complex requirements of the Regional Transport Survey.

A logical framework for the Survey has been developed to ensure that transportation provisions are directed at stimulating the economies, and that assumptions and forecasts are thoroughly tested against "best" strategies for the use of transport facilities and the allocation of resources.

A cyclical approach has been planned for the Survey which will ensure that early evaluations are made of the Region's economies and transportation needs and that subsequent refinements can be positively identified and directed to benefit the Bank and the participating countries. This approach will provide a means of convergence from an initial assessment of the economic potentials of the region to a realistic statement of an action program to achieve them.

Finally, careful attention has been given to ensure that the detailed methodology is appropriately related to the needs of the Survey. As a result, the approach represents a sound and reliable means for ensuring for the ADB and participating countries that an effective convincing basis will be provided to stimulate the development of the region.

The detailing of this approach into a comprehensive program for the completion of the Survey is discussed in the next chapter of this Inception Report.

V. PROGRAM FOR THE REGIONAL TRANSPORT SURVEY

In this chapter the cyclic approach described in Chapter IV has been developed into a detailed program to satisfy the goals and priorities outlined in Chapter II.

The nature of the Survey is so extensive and the range of activities to be completed so diverse that the program is, of necessity, complex. Economic and transport concepts and analyses must be phased and inter-related throughout the Survey.

Nevertheless, it is possible to condense the program to a logical series of steps in order to present an outline of the approach. For convenience, this condensed program is illustrated in Figure 1 and each step is described in the following pages.

The General Economic Survey and the Transport System Status Report is projected for the end of February, 1970. The first cycle of the program will be completed at the end of April, 1970, at which time a more exhaustive report on the Transport System will be available.

The second cycle will be completed at the end of October, 1970, and the third at the end of January, 1971.

1. Review and Evaluate National Transport Data

A basic input to the Survey will be the data and concepts embodied in records and in the transport and economic reports already completed in the Region and in national plans for development. A substantial amount of data with respect to the RTS countries was collected during the Inception Period. One of the early activities in the Survey will be to complete the work, initiated during the Inception Period, of collecting and reviewing this information.

During the period, January to March, 1970, material will be reviewed in depth and efforts will be begun to fill identifiable gaps. It will be necessary during this period to visit RTS countries to discuss specific aspects of the data problem and to organize procedures to collect data which will be needed for later work but which are not presently

available. Because the available time is short, actual collection of data will be minimal; we shall have to rely, for the first cycle, mainly on material already collected.

2. Organize Counterpart Staff

Early in 1970, steps will be taken to establish counterpart staff functions in participating countries for the important tasks of liaison, provision of insights and advice, and organization and supervision of data collection and analysis.

The Survey Team will initially work with the Survey Liaison Officers in each country to establish broadly the requirements for the Survey and to review the nature of the work and of the staff available. Further details will be evolved as the Survey progresses.

3. Further Develop Economic Surveys of the Region

In order to identify the economic activities that will have the greatest impact on the development of the Region and to evaluate the implications of proposed projects, we must obtain a description and gain an appreciation of the economies of each of the RTS countries. During the Inception Period, we compiled a great deal of data, which constitutes a major basis for this step. As in Step 1, it remains for us to fill the gaps and to establish basic assumptions about the future development of each country and the Region as a whole.

In conducting the economic surveys we shall be compiling information on each of the RTS countries and on the Region. The nature of the data collected and the extent to which it is disaggregated will vary between countries in accordance with the anticipated needs of the RTS. The following types of data will in any case be included.

a. Size and rate of growth of total population.

b. Spatial distribution of population and natural resources, economic activities and land use.

c. Level and rate of growth and Gross National Product.

d. Industrial composition of Gross National Product by major sectors.

e. National Expenditure items such as consumption and investment.

f. Balance of Payments.

g. Foreign Trade.

h. Production data for selected commodities.

The Survey will include an analysis of these economic trends, as well as discussions of social and political trends of each of the countries and assumptions concerning the future trends. Additional data and assumptions will be added to the information on each country throughout the RT Survey; and trends projected to 1990, as derived in Step 5, will also be incorporated into the final report.

In developing the information for each of the countries we shall consider the national economic plans, as well as the findings of recent major studies conducted in most of the RTS countries and other valuable sources of information.

While much of the data necessary for the analysis can be compiled from the combined resources of the ADB and the RTS libraries, specific requests for information will be addressed to our counterpart staffs in the RTS countries and sources outside the governments.

4. Develop General Model Principles

Before embarking on the task of building the growth models of the region, we will develop the necessary principles. This will require determining and agreeing on the functional specifications, and of drawing in detail, the flow diagrams of the general model and specifying the form of the inputs and outputs. This step will generate additional data needs, e.g., inputs for the production functions. It is expected that this step will be completed within the first two months of the Interim Period.

5. Generate Preliminary Forecasts

In order to complete our first cycle approximations of transport requirements, we shall make preliminary forecasts of changes in the economic structure of each country and trade flow patterns. These first estimates, covering up to 1990, will draw as much as possible on existing forecasts. They will be checked for consistency with the assumptions and conclusions reached in the economic surveys of Step 3.

A major function of this step will be to provide an initial set of trade flow activities to be used in the preliminary resource allocation model. Since detailed forecasts from our economic models will not be available in time for this analysis, we will have to use approximating techniques, based on time series. The estimates of commodity flows, up to 1990, will be converted from value into volume through the application of conversion factors developed in Step 9. To the extent possible and necessary, origins and destinations will be specified. The list of commodities will include those items in each country which either constitute a major portion of total trade volume at present or are expected to do so in the future.

The projections will be completed within the first two months of the Interim Period to assure enough time for consideration in the resource allocation analysis.

6. Identify Economic Projects and Activities

On the basis of our initial analysis of the economic surveys, we will identify the projects to be conducted by the sectoral specialists. These projects will concern prospects for the agricultural, mining, forestry, fishing, manufacturing, and tourism sectors in the Region. The decision as to the nature of the projects will be based on the set of priorities and preliminary findings derived early in the Interim Period.

In this step we shall use inputs from the sectoral specialists, who will have reviewed a preliminary list of projects and considered the data base together with the assessment of it resulting from the Inception Period. Their contribution expected in late March, 1970 will be considered by the resident team in modifying and refining this list.

7. Further Review Regional Transport System

Concurrently with the activities in the area of economics, the Survey Team will complete its preliminary review of the Region's transport system.

Preliminary field trips to inspect ports, railways, etc. may be made to increase our understanding of operations and to clarify our thinking for Step 11 - Preliminary Assessment of the Transport System's Capabilities and Bottlenecks.

For example, a broad survey of regional shipping will be made during which we will examine such matters as the types of vessels moving, the impediments to navigation in the region and the major characteristics of ports and accesses to ports from the point of view of the maritime operator.

An important component of this step will be to identify and make preliminary evaluations of regional transport projects such as those listed in Chapter II.

This activity combined with the review of national plans will provide the bulk of the information required for the status report of the regional transport systems due at the end of February, 1970.

8. Formulate Preliminary Definition of Transport Capacity

As a result of the reviews of national plans and data and of the regional transport system, we will make a preliminary assessment of the present and future capabilities of the regional transport system to provide service. This activity will require our consideration of such aspects as operating costs, organizational needs, rates of growth, the condition and extent of equipment and facilities, probable investments in the region, and generally of the viability of transport operations

We will complete this activity by closely analyzing the inventory and performance information gathered from reports and visits and by relating this to international transport experience. It will be completed in the first cycle based on limited data gained from the early data collection programs.

The assessments made for the various modes will be re-evaluated and refined later in the Survey. Their purpose at this early stage is to permit a comparison to be made between forecast levels of goods and people movements, and the capacity of the sytem to handle them.

This work will be completed by the Survey Team in early April, 1970.

9. Develop Transport Coefficients

Transport coefficients will be developed early in the Survey to provide a basis for converting economic forecasts into physical demands for transport.

These coefficients for converting money values and quantity figures into units of modal capacity will be developed largely from experience already available in the Team. Where more information is required about particular forms of transport in the Region, it will be gained from the scheduled visits to particular countries and organizations.

In the Interim Period (i.e., the early part of the first cycle), attention will be confined to preparing generalized coefficients sufficient for use in the first screening of the Region's capacity to handle goods and people movements. These coefficients will then be refined where necessary during the detailed studies of the second cycle.

10. Forecast Technology

In this step, the Team members will list and evaluate the technological innovations that can be expected to play a significant operational role in the transport systems of the 1970-1990 period. Because such innovations take time to reach full operational status, we will confine the forecast to systems now in the discussion, design, prototype, or early operational stages.

11. Preliminary Assessment of the Transport System's Capabilities and Potential Bottlenecks

Based on the general preliminary economic forecast, and using the transport coefficients developed in Step 9, a determination will be made of increases or decreases in traffic, or revised channels of transport. These increases, decreases, or revised routings will then be compared with the data developed in Step 8, where a preliminary assessment is made of capacity, viability, costs, etc. of the existing transport system.

This activity will, therefore, provide estimates of the demands on the transport system during the coming years. It will also indicate future bottlenecks and potential aspects for transport development.

This activity will develop a preliminary evaluation of the state of the regional transport system. This will give details of:

- Physical Characteristics
- Administration
- Traffic
- Service Level
- Potential for Expansion

This work should be completed by the RTS team in Manila in April, 1970.

12. Identify Transport Investment Opportunities

From the data previously developed, we will now identify at least two groups of transport investment opportunities. The first group will include those projects which very clearly stand out as prime candidates for immediate analysis or, even possibly, immediate investment. The second group of opportunities may not stand out as clearly in terms of immediate need as those in the first group but will represent opportunities requiring further detailed analysis.

Projects in the first group, if any, will be reported to ADB as soon as they are identified.

This work, which should be completed in April, 1970, will be done by the RTS team in Manila.

13. Specify Economic Sectoral Work

After the projects and areas of opportunity for economic development have been identified and considered together with a preliminary list of transportation projects, specific sectoral studies will be commissioned. In selecting and planning the sectoral work, we will place heavy emphasis on the comprehensive studies that are available or will be in the course of the RTS. We plan to use existing surveys as much as possible after having carefully considered their applicability to our study. We will also attempt to integrate our activities with other study teams currently studying these sectors in the Region, such as ECAFE's industrialization survey, the ADB's study of Asia in the 1970's, ASEAN's survey and other studies going on at the same time as ours on a national level.

The assignments will specify both the questions to be measured by the sectoral specialists and the format of the responses. This task will be executed very early in the beginning of Phase II. Basically, three types of studies will be commissioned. These are indicated in the diagram by Step 17, Step 18, and Step 19.

14. Develop Resource Model Principles

This activity will be initiated during the Interim Period (December-February). It will define the relationships and criteria that will influence the selection of transport projects for investment. There will be two directions of development: first, a qualitative definition of the types of constraints that must be imposed, of the benefits that can be expected, and of the costs that must be borne; second, an initial appreciation of the relationship between the results of formal calculation and the intervention of expert judgment. The first direction will lead to a formalization of the model, essentially as a series of linear programs of one kind or another, and this will lead to a task of defining and estimating the corresponding constants (e.g., number of middle-level engineers needed per mile of new highway). The second direction will

lead to a work chart in which calculations and reports of the results alternate with multi-disciplinary conferences involving transport experts, economists, systems analysts, and officers of ADB.

15. Prepare Interim Report on Economics

The Interim Report on Economics will be prepared at this point of the work program.

16. Prepare Interim Report on Transportation Status

The Interim Report on Transportation Status will be prepared at this point of the work program.

17. Conduct Economic Sector Studies -- Forecasts for Specific Commodities

Specific work in the agribusiness, tourist, manufacturing, forestry, fisheries and minerals sectors will be handled by specialists primarily from Arthur D. Little in Cambridge, Massachusetts. This will be coordinated by a staff member familiar with Southeast Asia who will maintain contact with the resident economist in Manila. Forecast work will be done in all sectors while more detailed studies and position papers will be prepared on a more selective basis.

One of the major tasks of the sectoral specialists will be to make forecasts of a number of commodities of importance to the economic development of the Region. Forecasts will be made based on past trends, an estimate of the resource capabilities of the Region and of the future world markets for these commodities. The forecast horizon will extend to 1990 in terms of both value and volume; a maximum-minimum range for these forecasts will be determined; and gross origin and destination indications will be made where feasible.

These forecasts will be made on the basis of data that will already have been collected before Cycle 2 begins and will be conducted by industry specialists early in Cycle 2. In addition to background information for the sectors and commodities being forecast, the specialists will receive general economic data for the Region and preliminary

forecasts made earlier in the survey. If additional information is required in certain countries, we will try to obtain this through the counterpart staffs. We will make as much use as possible of existing analyses for the Region contained in numerous recent surveys.

18. Investigate in Detail Economic Opportunities

For some commodities, and even entire sectors, the outlook will depend greatly on new developments of unutilized or under-utilized resources. In specific areas which we believe to have the greatest potential, and which are closely related to transportation, a pre-feasibility study will be made by an appropriate sector specialist. These studies will appraise the development potential of a particular resource or market on either a national or regional level. The potential change in economic activity will be translated into changes in transport demand. The opportunities will be described in terms of capital and labor requirements as well as their broad implications.

As much use as possible will be made of existing studies. In many cases, unpublished technical data from a country's board of investments, development bank or various ministries will have to be obtained. The specialist will also have to conduct interviews and make field trips to obtain primary data. For this task, counterpart staffs in the RTS countries will prove to be a most useful resource. We will also rely heavily on the technical staffs and libraries of ECAFE and other international agencies.

These studies will begin early in the second cycle. Findings will be submitted as they become available. There will be as much communication of preliminary findings among the sector specialists and between them and the transport specialists as possible.

19. Develop Position Papers

In certain sectors, very promising opportunities for development may exist in which transportation either does not play a significant role or is normally financed by the private sector, or will be provided by systems generated from other needs. Sectoral specialists will prepare position papers which can subsequently be used by the ADB or the national governments for establishing guidelines (stipulations for transport development in basic loan agreements).

In preparing these position papers, the specialists will draw heavily on past experiences in the development of these sectors in other regions and point out the precautions that must be taken. Information collected during the Inception and Interim Periods concerning the resource capabilities of the Region will provide the basis for this analysis but additional data from primary sources will have to be collected by the specialist. For this, he will draw on the counterpart staffs in the RTS countries and the technical resources of ADB and the UN. The work will begin early in Stage II, i.e., in the latter half of the first cycle.

20. Investigate in Detail Transport Investment Opportunities

This is the most important step in the analysis of transport investment projects and will require the greatest amount of time and effort. It is the core of the second cycle.

During the period of this analysis (estimated to run from May through October, 1970), the transport projects previously identified (Step 12) as requiring further detailed analysis will be studied. As stated in Chapter II, this will include studies in all areas of air, rail, shipping, ports, inland waterways, and highways.

The activities in this phase of the second cycle will depend on the conclusions reached during the first cycle, but can in general terms be stated as follows:

- Refine data used for the first cycle report and organize the collection of supplementary data where necessary to present a coherent picture of the present position.

- Refine analyses of costs. For this activity in the case of certain modes, a substantial interviewing program will be required. This will be done by the RTS Manila team in collaboration with counterpart staff in the respective countries. These analyses will be closely coordinated between the various transport modes.

- Refine assessments of appropriate developments concurrently with the refinement of the traffic demand forecasts and forecasts of developments in the transportation industry. For each project (which may be a physical

expansion, technological innovation or an institutional measure) the resources required for its implementation and its anticipated merits will be assessed, and where possible, quantified in monetary terms.

- o Identify high-priority projects for which some specific immediate actions appear necessary and prepare an action program.

21. Develop Economic Models

For each of the RTS countries we will design, build and test an economic growth model based on the principles previously established and on the data compiled in the economic surveys. Since the availability and reliability of data vary from country to country, each model will have unique features, although the basic structure will be the same for each. The models will be designed and constructed by an econometrician working closely with each of the economists responsible for RTS country.

22. Generate Economic Forecasts

Forecasts for the export demand of the major commodities and the growth models for each of the countries will be used to forecast the effect these demands will have on the region's economies. Since we will have a range of possible trade flow patterns, we will be able to test the effect of various possibilities on the countries' growth.

The models will be tested several times primarily for consistency, and modified if the independently determined variables do not conform to the structure of the models. They will take into account the ECAFE and JERC models of the region in drawing up initial assumptions, definitions and values of exogenous variables. The models will be run approximately mid-way through the second cycle.

23. Modify Forecasts

Based on the more detailed investigation of economic opportunities, the forecasts developed in Step 22 will be modified.

24. Analyze Funding Possibilities

An essential requirement for the determination of the action program will be the definition of levels of funds available for transport investments in the Region and costs associated with their use. The action program cannot be formed unless we know what funds are available and what the terms are.

Since many of the higher-priority projects will be implemented and financed through existing organizations and channels, these references will be investigated.

25. Develop Resource Allocation Model

In Step 14 we will have developed the principles to be used in the resource allocation model. In Step 25, we will apply computer programs already proven in other applications, and will link them into a process for evaluating proposed systems.

Mathematical expressions will be developed to inter-relate the demand for transportation, the constraints in the system (limiting the use of resources) and costs. These relationships will be developed via linear programming and associated techniques to establish quantitative criteria which will permit choices to be made between alternative courses of action to ensure satisfactory investment programs.

This model will be developed during the second cycle and will be used during that cycle as an aid in establishing preliminary action programs.

26. Schedule Resources and Test Sensitivity

This activity is a second-cycle version of Step 11. The modified forecasts of the need for transport and of its impact will be integrated with the transport opportunities and available funds to establish a satisfactory program for the region.

Benefits, costs, and restrictions on alternatives will be defined; criteria will be specified in more detail than before. The resources allocation model will then be run.

In this cycle, the model will be run under different sets of data and different sets of specifications conditions to determine their influence on the action programs. These sensitivity runs will ensure that the significance of uncertainties in the data is determined and that action programs are developed with proper attention to the reliability of the underlying data and assumptions

27. Analyze and Interpret Results

After the resources have been scheduled through the allocation model, we will review the results in order to ensure that they satisfy all requirements in the region, including any practical limitations (perhaps of a socio-political nature) not quantified in the model.

We will then determine the high-priority items capable of early incorporation in action programs together with a list of transport/economic opportunities and deficiencies to be further analyzed.

28. Complete Program Evaluations

After the sectoral projects and the transport projects have been jointly evaluated, the sectoral specialist may be asked to make adjustments or refinements to the project evaluation. He may be asked to answer questions that have arisen from the integrated analysis or to make extensions of his study on the basis of additional data generated during the study.

In the third cycle, following the allocation of resources and identification of important investment opportunities, we will complete the evaluation of programs identified and selected for further study in the second cycle.

This work will be carried out by the survey team in Manila and by the industry experts involved earlier. Participation by the counterpart staff in this process will be encouraged to the extent to which it is practical.

29. Revise Funding Analysis

In the third cycle of the Survey, attention will again be given to the limitations imposed by funds available, this time in more detail. The position will be reviewed with informed authorities and a confirmed or modified statement prepared of fund sources, levels, timing and costs.

30. Design Organization to Maintain Continuity

This step consists of developing recommendations for organizations that will carry on regional research in transport, or perform transport-related functions for the region. It is located in the third cycle, but work on it will be begun as soon as Stage II begins. We do not know whether any concrete organizations can be formed and developed during the RTS; if they can be, we will assist in the process.

Areas which will be considered in this recommendation are, for example:

- The operation of centers for training of technical and skilled or semi-skilled personnel.
- The establishment of regional pools of specialized and expensive transport equipment and machinery for utilization by the participating countries.
- The creation of an organization to facilitate the development and improvement of the regional transportation system, e.g., by carrying out pilot surveys on selected fields and establishing their economic impact on the countries concerned.

31. Adjust for Transport/Economic Investment Opportunities and Deficiencies

In the last period of the study (October, 1970-January, 1971) before final recommendations are made and the report is written, adjustments and expansion to the various elements of the study will be

made to reflect new transport and economic developments in the region. This will be accomplished by modification, adjustment, and re-examination of the previous analyses to establish net changes in recommended program implementation plans.

The projects singled out as investment opportunities will be subjected to the most critical review. Also, intermodal transport possibilities will be thoroughly reviewed.

A total view of the projected transport system will be taken to determine whether, within the bounds of reality, it represents a reasonable system capable of providing adequate transportation during the coming years.

32. Complete Framework for Analyses

During the third cycle, we will formalize the approach taken and package the resource allocation model, related data, procedures, and computer programs in a format which will permit their continued use in future analysis.

33. Prepare Draft Report

In this activity, the detailed findings of the Survey Team will be drawn together into a comprehensive statement.

Any necessary revisions to the position defined in the Interim Reports will be made to provide a carefully considered Status Report for the Region.

Detailed forecasts of the region's economy and transport development, as prepared and revised during the Survey, will be presented together with the framework and data used in their development.

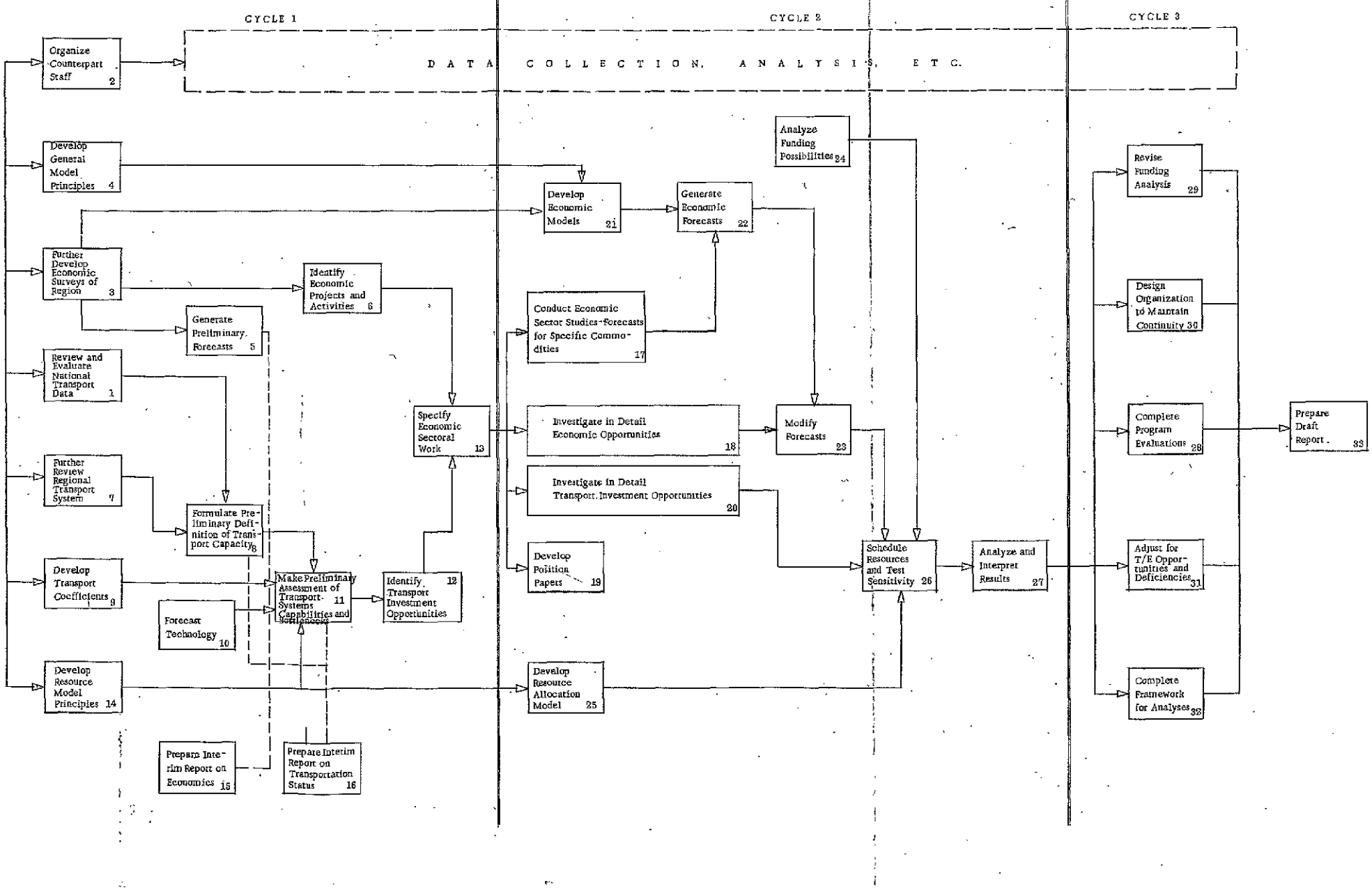
A detailed statement will be developed describing the framework employed in the Survey and modified as found necessary for the Bank's continuing use. This would comprise data criteria and procedures - including computer programs prepared for the purpose.

The action program emerging from the Regional Transport Survey will also be documented. It can be anticipated that this will cover

- opportunities for immediate investment in transport or associated developments
- defined section to ensure the continuing usefulness of the RTS findings
- areas warranting more detailed study

In addition, recommendations for institutional and cooperative development will be presented.

Figure 1
FUNCTIONAL FLOW CHART


CYCLE 1
CYCLE 2
CYCLE 3
DATA COLLECTION, ANALYSIS, ETC.
Organize Counterpart Staff 2
Develop General Model Principles 4
Further Develop Economic Surveys of Region 3
Review and Evaluate National Transport Data 1
Further Review Regional Transport System 7
Develop Transport Coefficients 9
Develop Resource Model Principles 14
Identify Economic Projects and Activities 6
Generate Preliminary Forecasts 5
Formulate Preliminary Definition of Transport Capacity 8
Make Preliminary Assessment of Transport Systems Capabilities and Bottlenecks 11
Forecast Technology 10
Identify Transport Investment Opportunities 12
Specify Economic Sectoral Work 13
Prepare Interim Report on Economics 15
Prepare Interim Report on Transportation Status 16
Develop Economic Models 21
Generate Economic Forecasts 22
Analyze Funding Possibilities 24
Conduct Economic Sector Studies-Forecasts for Specific Commodities 17
Investigate in Detail Economic Opportunities 18
Investigate in Detail Transport Investment Opportunities 20
Modify Forecasts 23
Develop Position Papers 19
Develop Resource Allocation Model 25
Schedule Resources and Test Sensitivity 26
Analyze and Interpret Results 27
Revise Funding Analysis 29
Design Organization to Maintain Continuity 30
Complete Program Evaluations 28
Adjust for T/E Opportunities and Deficiencies 31
Complete Framework for Analyses 32
Prepare Draft Report 33

VI. ORGANIZATION

The Regional Transport Survey requires the coordination of many different component groups with diverse responsibilities and authority structures. There are six groups directly responsible for the production of work: The ADL team resident in Manila; the personnel of the subcontractors' resident in Manila; the counterpart staffs resident in the several countries; ADL personnel resident in Cambridge (some of whom will be assigned to temporary duty in Manila); subcontractor personnel working at their home offices; and ADL's group of expert consultants, who will work primarily as temporary members of the Manila team, but who will also be available as a supplement to the home office work of ADL and its subcontractors.

The network of authority links together five elements: The Asian Development Bank; the governments of the participating countries (taken here as a single component because collectively they represent the Region for the purposes of the Survey and are embodied for these purposes in the Coordinating Committee); Arthur D. Little, Inc.; the home offices of the subcontractors; and the individual consultants to the Survey.

The organization chart presented in Figure 2 shows how the working components are to be related to the sources of authority. The ADL resident team in Manila, headed by the Project Director, will be directly responsible to the ADB for execution of the work. The ADL corporate management is, of course, ultimately responsible to the Bank.

The work of the transport research group requires coordination of two kinds: first, intermodal coordination, which ensures that competition and complementarity among modes are properly accounted for; second, coordination between transport-oriented concepts and motives on the one hand and economic concepts and motives on the other. The necessary coordination will be secured by a continual interchange of ideas among the team members, via frequent review meetings and circulation of working memoranda, and also by the scheduling of joint contributions to the program steps listed in Chapter V. The Deputy Director will be responsible for the direction of the systems analysis work and for coordination of the research work in general.

The project Control Officer will oversee the execution of the program steps in accordance with the project plan depicted in Figure 1.

Our subcontractors will assist us in the following fields:

KAMPSAX -- ports and harbors

Pacific Consultants K. K. -- highways

Walter D. Scott & Co. -- economics, systems analysis, computer programming and usage, organizational studies

SyCip, Gorres, Velayo & Co. -- management studies, data processing, economics

Adrian Wilson Associates -- airports and air terminal facilities

Engineering studies, if required, for pipelines, roads, and rail will be supplied by Pacific Consultants, K. K.

Figure 2
REGIONAL TRANSPORT SURVEY
ORGANIZATION CHART